

Exhibit 1
Claims of Certain Co-Pending Patent Applications

Pending claims from U.S. Patent 11/393,860

1. An IC card connector to be used in common for a plurality of IC cards of mutually different shapes via a common card inserting opening, comprising: a card accommodation portion including a front section for accommodating one IC card and a rear section formed at a position farther from said card inserting opening than the front section so as to partially overlap with the front section for accommodating the other IC card; a group of front contact terminals and a group of a rear contact terminals disposed in the front section and the rear section respectively, for electrical connection with the one IC card and the other IC card respectively; and a contact pressing plate which is disposed such that an end portion thereof facing said card inserting opening is movably provided between the first section and a space, in the rear section, overlapping with the front section in a thickness direction of the one and the other IC card, and which selectively presses the group of contact portions of the front contact terminals down up to a predetermined position; wherein said contact pressing plate presses the group of contact portions of the front contact terminals down to a predetermined position according to insertion of the one IC card or the other IC card to be accommodated in said front section and rear section thus to make the one IC card accommodated in the front section electrically connectible with the group of contact portions of the front contact terminals or to make the other IC card accommodated in the rear section electrically connectible with the rear contact terminals, or releases the a group of contact portions from the predetermined position according to ejecting operation of the one IC card or the other IC card accommodated in the front section and the rear section.

2. The IC card connector according to claim 1, further comprising a locking/unlocking mechanism that retains the contact pressing plate selectively in a predetermined attitude.

3. An IC card connector, comprising: a multiple card accommodation including a first section for removably accommodating via a common card inserting opening a first IC card out of a plurality of IC cards of mutually different shapes, a second section for accommodating a second IC card, formed at a position farther from the card inserting opening than the first section in a line therewith and partially overlapping therewith, and a third section for accommodating a third IC card, formed at a position still farther from the card inserting opening than the first and the second sections, in a line therewith and partially overlapping therewith; a group of first contact terminals, a group of second contact terminals and a group of third contact terminals sequentially disposed in the loading/unloading direction of the IC card so as to correspond to the first section, the second section and the third section respectively, for electrical connection with the first IC card, the second IC card and the third IC card respectively; and a contact pressing plate slidably and rotational movably disposed midway between said group of the first contact terminals and the group of second contact terminals, so as to press the group of

contact portions of the second contact terminals down to a predetermined position or to release the group of contact portions from the predetermined position according to insertion or removal operation of the second IC card or the third IC card.

4. The IC card connector according to claim 3, further comprising a locking/unlocking mechanism that retains said contact pressing plate selectively in a predetermined attitude.

5. The IC card connector according to claim 4, wherein the locking/unlocking mechanism comprises a locking/unlocking member disposed adjacent to the second section of said multiple card accommodation, having an end portion that selectively keeps an engaged state of retaining said contact pressing plate or a disengaged state of releasing said contact pressing plate according to insertion or removal operation of the second IC card and the third IC card, and a biasing member that biases said contact pressing plate in the disengaged state so as to keep the engaged state.

6. The IC card connector according to claim 5, wherein, when the second IC card is larger in width than that of the third IC card, upon mounting of the second IC card on the second section said locking/unlocking member keeps the disengaged state to cause said contact pressing plate to rotate and slide, thereby allowing the second IC card to be mounted on the second section.

7. The IC card connector according to claim 5, wherein, when the second IC card is larger in width than that of the third IC card, upon mounting of the third IC card on the third section said locking/unlocking member keeps the disengaged state to cause said contact pressing plate to rotate, thereby allowing the third IC card to be mounted on the third section.

[0094] Then, upon pulling further outward the end portion of the XD card XD exposed outside the IC card connector, the XD card XD is removed.

[0095] Accordingly, in the foregoing embodiment, when mounting the MEMORY STICK MS for example, the tip portions of the contact portions of the contact terminals 14*ai* unused are pressed against by the unlocked contact pressing plate 20 up to a position where the contact portions do not interfere with the tip portion of the MEMORY STICK MS. Such a structure allows to prevent the contact portions of the contact terminals 14*ai* from being damaged, and since the contact pressing plate 20 is slidably and rotational movably disposed between a group of the contact terminal 18*ai* and a group of the contact terminal 16*ai*, the contact pressing plate 20 can be provided inside the IC card connector within a relatively small space. This permits reducing the overall length of the IC card connector provided with a multiple card accommodation.

[0096] The present invention has been described in detail with respect to preferred embodiments, and it will now be apparent from the foregoing to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspect, and it is the intention, therefore, in the apparent claims to cover all such changes and modifications as fall within the true spirit of the invention.

What is claimed is:

1. An IC card connector to be used in common for a plurality of IC cards of mutually different shapes via a common card inserting opening, comprising:

- a card accommodation portion including a front section for accommodating one IC card and a rear section formed at a position farther from said card inserting opening than the front section so as to partially overlap with the front section for accommodating the other IC card;
- a group of front contact terminals and a group of a rear contact terminals disposed in the front section and the rear section respectively, for electrical connection with the one IC card and the other IC card respectively; and
- a contact pressing plate which is disposed such that an end portion thereof facing said card inserting opening is movably provided between the first section and a space, in the rear section, overlapping with the front section in a thickness direction of the one and the other IC card, and which selectively presses the group of contact portions of the front contact terminals down up to a predetermined position;

wherein said contact pressing plate presses the group of contact portions of the front contact terminals down to a predetermined position according to insertion of the one IC card or the other IC card to be accommodated in said front section and rear section

thus to make the one IC card accommodated in the front section electrically connectible with the group of contact portions of the front contact terminals or to make the other IC card accommodated in the rear section electrically connectible with the rear contact terminals, or releases the a group of contact portions from the predetermined position according to ejecting operation of the one IC card or the other IC card accommodated in the front section and the rear section.

2. The IC card connector according to claim 1, further comprising a locking/unlocking mechanism that retains the contact pressing plate selectively in a predetermined attitude.

3. An IC card connector, comprising:

- a multiple card accommodation including a first section for removably accommodating via a common card inserting opening a first IC card out of a plurality of IC cards of mutually different shapes, a second section for accommodating a second IC card, formed at a position farther from the card inserting opening than the first section in a line therewith and partially overlapping therewith, and a third section for accommodating a third IC card, formed at a position still farther from the card inserting opening than the first and the second sections, in a line therewith and partially overlapping therewith;

- a group of first contact terminals, a group of second contact terminals and a group of third contact terminals sequentially disposed in the loading/unloading direction of the IC card so as to correspond to the first section, the second section and the third section respectively, for electrical connection with the first IC card, the second IC card and the third IC card respectively; and

- a contact pressing plate slidably and rotational movably disposed midway between said group of the first contact terminals and the group of second contact terminals, so as to press the group of contact portions of the second contact terminals down to a predetermined position or to release the group of contact portions from the predetermined position according to insertion or removal operation of the second IC card or the third IC card.

4. The IC card connector according to claim 3, further comprising a locking/unlocking mechanism that retains said contact pressing plate selectively in a predetermined attitude.

5. The IC card connector according to claim 4, wherein the locking/unlocking mechanism comprises a locking/unlocking member disposed adjacent to the second section of said multiple card accommodation, having an end portion that selectively keeps an engaged state of retaining said contact pressing plate or a disengaged state of releasing said contact pressing plate according to insertion or removal operation of the second IC card and the third IC card, and a biasing member that biases said contact pressing plate in the disengaged state so as to keep the engaged state.

6. The IC card connector according to claim 5, wherein, when the second IC card is larger in width than that of the third IC card, upon mounting of the second IC card on the second section said locking/unlocking member keeps the disengaged state to cause said contact pressing plate to rotate and slide, thereby allowing the second IC card to be mounted on the second section.

7. The IC card connector according to claim 5, wherein, when the second IC card is larger in width than that of the third IC card, upon mounting of the third IC card on the third section said locking/unlocking member keeps the disengaged state to cause said contact pressing plate to rotate, thereby allowing the third IC card to be mounted on the third section.

Issued claims from U.S. Patent 7,182,645

1. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch but different card external dimensions can be selectively attached, comprising: a connector body having a space configured to receive either of two inserted IC cards having different dimensions; and a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which either IC card is inserted, wherein each of the contacts provided in the space has a first contact point disposed on a first elastic portion, a second contact point disposed on a second elastic portion, a plate-like fixing portion, and a terminal portion, the first elastic portion is positioned in a cantilever-like manner at a front side of the plate-like fixing portion, and the second elastic portion is positioned in a cantilever-like manner at a rear side of the plate-like fixing portion, the first and second contact points are positioned in a front-and-rear relationship along the direction along which either IC card is inserted, the first contact point is located to make electrical contact with a first IC card when the first IC card is inserted in the card connector and said second contact point is located to make electrical contact with a second, dimensionally different, IC card when the second IC card is inserted into the card connector.
2. The card connector for an electronic device as claimed in claim 1, wherein the first contact point does not contact the second IC card when the second IC card is inserted and the second contact point does not contact the first IC card when the first IC card is inserted.
3. The card connector for the electronic device as claimed in claim 1, wherein: said first elastic portion is formed by partially cutting and elevating a portion of said fixing portion.
4. The card connector for the electronic device as claimed in claim 3, wherein said fixing portion is further provided with holes between said first and second elastic portions.
5. The card connector for the electronic device as claimed in claim 3, wherein said first and second elastic portions extend in different directions along said contact.
6. The card connector for the electronic device as claimed in claim 3, wherein said first and second elastic portions extend in the same direction along said contact.
7. The card connector for the electronic device as claimed in claim 3, wherein at least one of said first and second elastic portions is partially cut and elevated to extend in the direction along which the first and second IC cards are inserted.
8. The card connector for the electronic device as claimed in claim 3, wherein said first and second contact points have different heights.
9. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch can be selectively attached, comprising: a space configured to receive one of a first IC card and a second different dimensional IC card; a plurality of

contacts provided in the space, said contacts being substantially parallel to the direction alone which the first and second IC cards are inserted; a guide mechanism for identifying which of said first and second IC cards is being inserted; and an actuator for guiding inserted IC cards based on the result of the identification by the guide mechanism, wherein at least one of the contacts provided in the space has first and second contact points in a front-and-rear relationship along the direction in which the IC card is inserted, the first contact point contacts a first pad on the first IC card when the first IC card is inserted, the second contact point contacts a second pad on the second IC card when the second IC card is inserted, when the first IC card is inserted, the actuator guides the first IC card to a position where the first contact point contacts the first pad and, when the second IC card is inserted, the actuator guides the second IC card to a position where the second contact point contacts the second pad.

10. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch can be selectively attached, comprising: a space configured to receive one of a first IC card and a second different dimensional IC card; a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which the first and second IC cards are inserted; a spring-loaded gate dimensioned to permit passage of said first IC card and prevent passage of said second IC card; and a guide mechanism dimensioned to detect insertion of said second IC card and coupled to permit pivoting of said gate upon detection of said second IC card to permit passage of said second IC card into said space, wherein at least one of the contacts provided in the space has first and second contact points in a front-and-rear relationship along the direction in which the IC card is inserted, the first contact point contacts a first pad on the first IC card when the first IC card is inserted, and the second contact point contacts a second pad on the second IC card when the second IC card is inserted.

11. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch but different card external dimensions can be selectively attached, comprising: a connector body having a space configured to receive either of two inserted IC cards having different dimensions; and a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which either IC card is inserted, wherein at least one of the contacts provided in the space has a first contact point disposed on a first elastic portion, a second contact point disposed on a second elastic portion, a plate-like fixing portion, and a terminal portion, the fixing portion comprises first and second plate-like sections, the first plate-like section extends from the first elastic portion to the second elastic portion, the second plate-like section is disposed between the second elastic portion and the terminal portion, and the first and second plate-like sections lie in a plane substantially perpendicular to a direction in which the first and second contact points deflect, the first and second contact points are positioned in a front-and-rear relationship along the direction along which either IC card is inserted, the first contact point is located to make electrical contact with a first IC card when the first IC card is inserted in the card connector and said second contact point is located to make electrical contact with a second, dimensionally different, IC card when the second IC card is inserted into the card connector.

at the front side of the card receiving space 90. It is noted that the small IC card 100 is retained by the shutter member 71 of the actuator 70 and thus is prevented from escaping in the upward direction. Therefore, the pad of the small IC card 100 may be contacted with the first contact point 41a of the contact 40 with an appropriate contacting pressure (see FIG. 4).

By providing the guide mechanism 60 and the actuator 70 to have a structure as described above, a card connector can be provided to which two types of IC cards can be selectively inserted and in which one card insertion slot is provided to allow the card connector to have a simplified structure and to eliminate the need for the thickness of two IC cards that has been required for a conventional card connector when the conventional card connector is inserted with two IC cards, thus allowing the present card connector to have a thinner shape.

The feeling lock member 80 is a device for preventing the large IC card from jumping out of the card receiving space 90 when the large IC card is discharged by the eject mechanism 50. The feeling lock member 80 is provided such that one end of thereof is fixed to the connector body while the other end thereof is formed as a spring member protruding into the card receiving space 90.

Second Embodiment

As described above, the present embodiment described a card connector in which one of two IC cards can be selectively received and one card insertion slot is provided. However, the contact characterized in the present invention also can be applied to a conventional card connector having two card insertion slots, an example of which is shown in FIGS. 7A to 7C. FIG. 7A is a schematic cross-sectional view of a card connector inserted with a small card. FIG. 7B is a schematic cross-sectional view of a card connector inserted with a large card.

As shown in the drawings, the upper stage of the card connector 10a has the first card receiving space 90b for storing a large IC card while the lower stage thereof has the second card receiving space 90a for receiving a small card via a division plate 25, respectively. The contact 40 is provided in the same manner as that of the first embodiment.

When the small IC card 100 is inserted to the lower stage of the card receiving space 90a, the first contact point 40a of the contact 40 that is provided at the front side to have a lower height is contacted with the pad of the small IC card 100. When the large IC card 200 is inserted to the upper stage of the card receiving space 90b, the second contact point 41b that is provided at the rear side to have a higher height is contacted with the pad of the large IC card.

In the case of the second embodiment, the contact as shown in FIG. 7C also may be provided at the division plate 25. In this case, the small IC card 100 to be inserted into the lower stage of the card receiving space 90a will be inserted therein with a surface of the IC card, i.e. with a surface with pads formed thereon facing up. The card receiving space 90a for a small IC card also may be provided at the upper stage while the storage section 90b for a large IC card being provided at the lower stage.

The present invention has been described in detail with respect to preferred embodiments, and it will now be apparent from the foregoing to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspect, and it is the intention, therefore, in the apparent claims to cover all such changes and modifications as fall within the true spirit of the invention.

What is claimed is:

1. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch but different card external dimensions can be selectively attached, comprising:

a connector body having a space configured to receive either of two inserted IC cards having different dimensions; and

a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which either IC card is inserted,

wherein each of the contacts provided in the space has a first contact point disposed on a first elastic portion, a second contact point disposed on a second elastic portion, a plate-like fixing portion, and a terminal portion,

the first elastic portion is positioned in a cantilever-like manner at a front side of the plate-like fixing portion, and the second elastic portion is positioned in a cantilever-like manner at a rear side of the plate-like fixing portion,

the first and second contact points are positioned in a front-and-rear relationship along the direction along which either IC card is inserted,

the first contact point is located to make electrical contact with a first IC card when the first IC card is inserted in the card connector and said second contact point is located to make electrical contact with a second, dimensionally different, IC card when the second IC card is inserted into the card connector.

2. The card connector for an electronic device as claimed in claim 1, wherein the first contact point does not contact the second IC card when the second IC card is inserted and the second contact point does not contact the first IC card when the first IC card is inserted.

3. The card connector for the electronic device as claimed in claim 1, wherein:

said first elastic portion is formed by partially cutting and elevating a portion of said fixing portion.

4. The card connector for the electronic device as claimed in claim 3, wherein

said fixing portion is further provided with holes between said first and second elastic portions.

5. The card connector for the electronic device as claimed in claim 3, wherein

said first and second elastic portions extend in different directions along said contact.

6. The card connector for the electronic device as claimed in claim 3, wherein

said first and second elastic portions extend in the same direction along said contact.

7. The card connector for the electronic device as claimed in claim 3, wherein

at least one of said first and second elastic portions is partially cut and elevated to extend in the direction along which the first and second IC cards are inserted.

8. The card connector for the electronic device as claimed in claim 3, wherein

said first and second contact points have different heights.

9. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch can be selectively attached, comprising:

a space configured to receive one of a first IC card and a second different dimensional IC card;

a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which the first and second IC cards are inserted;

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a guide mechanism for identifying which of said first and second IC cards is being inserted; and
 an actuator for guiding inserted IC cards based on the result of the identification by the guide mechanism, wherein

at least one of the contacts provided in the space has first and second contact points in a front-and-rear relationship along the direction in which the IC card is inserted, the first contact point contacts a first pad on the first IC card when the first IC card is inserted, the second contact point contacts a second pad on the second IC card when the second IC card is inserted, when the first IC card is inserted, the actuator guides the first IC card to a position where the first contact point contacts the first pad and, when the second IC card is inserted, the actuator guides the second IC card to a position where the second contact point contacts the second pad.

10. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch can be selectively attached, comprising:

a space configured to receive one of a first IC card and a second different dimensional IC card;

a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which the first and second IC cards are inserted;

a spring-loaded gate dimensioned to permit passage of said first IC card and prevent passage of said second IC card; and

a guide mechanism dimensioned to detect insertion of said second IC card and coupled to permit pivoting of said gate upon detection of said second IC card to permit passage of said second IC card into said space, wherein

at least one of the contacts provided in the space has first and second contact points in a front-and-rear relationship along the direction in which the IC card is inserted, the first contact point contacts a first pad on the first IC

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card when the first IC card is inserted, and the second contact point contacts a second pad on the second IC card when the second IC card is inserted.

11. A card connector for an electronic device to which one of a plurality of IC cards having the same pad pitch but different card external dimensions can be selectively attached, comprising:

a connector body having a space configured to receive either of two inserted IC cards having different dimensions; and

a plurality of contacts provided in the space, said contacts being substantially parallel to the direction along which either IC card is inserted,

wherein at least one of the contacts provided in the space has a first contact point disposed on a first elastic portion, a second contact point disposed on a second elastic portion, a plate-like fixing portion, and a terminal portion,

the fixing portion comprises first and second plate-like sections, the first plate-like section extends from the first elastic portion to the second elastic portion, the second plate-like section is disposed between the second elastic portion and the terminal portion, and the first and second plate-like sections lie in a plane substantially perpendicular to a direction in which the first and second contact points deflect,

the first and second contact points are positioned in a front-and-rear relationship along the direction along which either IC card is inserted,

the first contact point is located to make electrical contact with a first IC card when the first IC card is inserted in the card connector and said second contact point is located to make electrical contact with a second, dimensionally different, IC card when the second IC card is inserted into the card connector.

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